Norrell et al. (hereinafter Norrell) teaches an equalized envelope derived timing system to compensate for a differential time delay that occurs between upper and lower bandedges of a received signal (See Norrell, Abstract and Figure 5). Specifically, Norrell compensates for differential delay distortion at the upper and lower bandedges (See Norrell, column 7, lines 65-67). Norrell also compensates for the effects of amplitude distortion on the communications channel by attenuating the energy of a band located between the upper and lower bandedges (See Norrell, column 7, line 67 - column, line 2, and column 9, lines 5-8).

However, Norrell fails to teach or suggest a pre-equalizer for adjusting the amplitudes of the bandedges of a broadband signal in response to a control signal. In contrast to the teachings of Norrell, Applicant's claim 1 specifically recites:

> "Apparatus for equalizing the bandedges of a broadband signal comprising:
>
> a pre-equalizer for adjusting the amplitudes of the bandedges of said broadband signal in response to a control signal;
>
> a bandedge filter, connected to said pre-equalizer, for extracting a bandedge signal from said broadband signal; and
>
> a bandedge signal processor, connected to said bandedge filter, for generating said control signal in response to said bandedge signal." (emphasis added)

Applicant's invention teaches an apparatus and method for equalizing the amplitudes of the bandedges of a broadband signal. Specifically, the apparatus includes a pre-equalizer, a bandedge filter that extracts a bandedge signal from the broadband signal, and a bandedge signal processor that generates a control signal in response to the bandedge signal. The pre-equalizer adjusts, in response to this control signal, the amplitudes of the bandedges of the broadband signal. By adjusting the bandedges of the broadband signal, Applicant's invention reduces timing signal jitter associated with conventional equalizers.

In contrast to Applicant's invention, Norrell attenuates the energy in the center of the band located between the upper and lower bandedges (See Norrell, column 9, lines 5-8). Norrell simply passes energy in a region at the upper and lower bandedges through respective upper and lower bandedge filters (See Norrell, column 9, lines 2-5). Accordingly, Norrell does not adjust the amplitudes of the bandedges of a broadband signal as in claim 1 of Applicant's invention.

The Examiner cites to Figure 5, item 504 and column 8, lines 7-14 of Norrell as evidence of teaching the pre-equalizer in claim 1 of Applicant's invention. The Applicant respectfully disagrees.

Figure 5, item 504 of Norrell discloses a timing interpolation filter. This interpolation filter converts the symbol rate of a demodulated signal to that of a remote transmitter (See Norrell, Figure 4, item 416 and column 5, lines 57-64). In the context of Norrell, the interpolation filter converts a signal sampled at a rate of 3 samples per symbol into a signal at 2 samples per symbol (See Norrell, column 8, lines 3-7). This symbol rate conversion is unrelated to the adjustment of the bandedges of the broadband signal as in claim 1 of Applicant's invention.

Column 8, lines 7-14 of Norrell merely discusses the processing of samples from the timing interpolation filter to an equalizer delay line, an upper band edge filter (UBEF) and a lower band edge filter (LBEF). The equalizer delay line contains a sufficient number of samples to compensate for differential delays between UBEF and LBEF samples. In the case where a communications channel that delays the lower bandedge energy more than the upper bandedge energy, the LBEF uses the most recent samples and the UBEF uses samples older, more delayed samples. This compensation for differential delay distortion is also unrelated to the adjustment of the bandedges of the broadband signal as in claim 1 of Applicant's invention.

Therefore, the Applicant respectfully submits that claim 1 is not anticipated by the teachings of Norrell and, as such, fully satisfies the requirements of 35 U.S.C. § 102 and is patentable thereunder.

As claim 12 recites similar limitations to those of claim 1, the foregoing response also applies to claim 12. Therefore, the Applicant submits that claims 1

and 12, as they now stand, fully satisfy the requirements of 35 U.S.C. § 102 and are patentable thereunder.

Furthermore, dependent claims 9-10 and 15-16 depend, either directly or indirectly, from respective claims 1 and 12 and recite additional features therefor. As such and for the exact same reasons set forth above, the Applicant submits that none of these claims is anticipated with respect to the teachings of Norrell. Therefore, the Applicant submits that all these dependent claims also fully satisfy the requirements of 35 U.S.C. § 102 and are patentable thereunder.

II. REJECTION OF CLAIMS 1, 9-10, 12 and 15-16 UNDER 35 U.S.C. § 103

The Examiner has rejected claims 1, 9-10, 12 and 15-16 in Paragraph 6 of the Office Action as being unpatentable over the Gitlin et al. patent (United States patent 4,253,184 issued February 24, 1981). The rejection is respectfully traversed.

Gitlin teaches a phase compensation arrangement before the equalizer in a quadrature amplitude modulated (QAM) receiver. Specifically, Gitlin compensates for phase-jitter in a signal that is caused by transmission through a power-line. This phase-jitter or phase perturbance is limited to the power line frequency and associated low-order harmonic frequencies (See Gitlin, column 3, lines 57-63). As such, Gitlin adjusts the components at the harmonically related sinusoids associated with phase-jitter caused by power-line transmission.

However, Gitlin fails to teach or suggest the adjusting of the bandedges of a broadband signal. Additionally, Gitlin fails to teach or suggest a bandedge filter, connected to said pre-equalizer, for extracting a bandedge signal from said broadband signal, or a bandedge signal processor, connected to said bandedge filter, for generating said control signal in response to said bandedge signal. In contrast to Gitlin, Applicant's claim 1 specifically recites:

> "Apparatus for equalizing the bandedges of a broadband signal comprising:
>
> a pre-equalizer for adjusting the amplitudes of the bandedges of said broadband signal in response to a control signal;

a bandedge filter, connected to said pre-equalizer, for extracting a bandedge signal from said broadband signal; and

a bandedge signal processor, connected to said bandedge filter, for generating said control signal in response to said bandedge signal." (emphasis added)

The Examiner conceded that Gitlin fails to disclose the use of bandedge signals. However, the Examiner nonetheless argued that if the baseband filters and the post-equalizer were replaced with bandedge filters, the bandedges would be recovered to reduce bandedge timing jitter, as with the timing jitter in Gitlin. The Examiner then concluded that it would have been obvious for one of ordinary skill in the art at the time of the invention to replace the baseband filters of the equalizers with bandedge filters to reduce the signal jitter of the bandedges. The Applicant respectfully disagrees.

The sections cited by the Examiner as teaching a baseband filter (Figure 1, items 17-19 and 21, and column 3, lines 33-36) merely recovers the baseband signal. In contrast to the bandedge filter in Applicant's invention, the cited components simply fail to filter any portion of a received signal. Since Gitlin does not filter the received signal, Gitlin cannot possibly teach or suggest the filtering of a signal, much less the extraction of a bandedge signal from a broadband signal. Moreover, since Gitlin fails to teach or suggest the extraction of the bandedge signal, it follows that Gitlin cannot possibly generate a control signal in response to the bandedge signal.

Additionally, Gitlin adjusts the components at the harmonically related sinusoids associated with phase-jitter caused by power-line transmission (See Gitlin, Figure 1, item 31 and column 3, lines 61-63). Gitlin also compensates for low-frequency components that may be present in the data (See Gitlin, Figure 1, item 21 and column 3, lines 42-47). However, these frequency components are simply not the same as bandedges in a broadband signal. In fact, since Gitlin adjusts power-line and other low-frequency components of a received signal, it

follows that Gitlin teaches away from apparatus for adjusting of bandedges of the broadband signal.

Therefore, Gitlin fails to teach or suggest the adjusting of the bandedges of a broadband signal. Additionally, Gitlin fails to teach or suggest a bandedge filter, connected to said pre-equalizer, for extracting a bandedge signal from said broadband signal, or a bandedge signal processor, connected to said bandedge filter, for generating said control signal in response to said bandedge signal. Therefore, the Applicant respectfully submits that claim 1, as it now stands, fully satisfies the requirements of 35 U.S.C. § 103 and is patentable thereunder

As claim 12 recites similar limitations to those of claim 1, the foregoing response also applies to claim 12. Therefore, the Applicant submits that claims 1 and 12, as they now stand, fully satisfy the requirements of 35 U.S.C. § 103 and are patentable thereunder.

Furthermore, dependent claims 9-10 and 15-16 depend, either directly or indirectly, from respective claims 1 and 12 and recite additional features therefor. As such and for the exact same reasons set forth above, the Applicant submits that none of these claims is obvious with respect to the teachings of Gitlin. Therefore, the Applicant submits that all these dependent claims also fully satisfy the requirements of 35 U.S.C. § 103 and are patentable thereunder.

III. ALLOWANCE OF CLAIM 11

The Applicant thanks the Examiner for allowing claim 11.

IV. CLAIMS 2-8, 13 AND 14-20 HAVING ALLOWABLE SUBJECT MATTER

The Applicant thanks the Examiner for identifying claims 2-8, 13 and 14 as containing allowable subject matter. Although the Examiner has suggested amending the claims in independent form including all the limitations of the base claim and any intervening claims, the Applicant does not view such an amendment as necessary at this time.

Conclusion

Thus, the Applicant submits that none of the claims, presently in the application, is anticipated under the provisions of 35 U.S.C. § 102 or obvious under the provisions of 35 U.S.C. § 103. Consequently, the Applicant believes that all these claims are presently in condition for allowance. Accordingly, both reconsideration of this application and its swift passage to issue are earnestly solicited.

If, however, the Examiner believes that there are any unresolved issues requiring adverse final action in any of the claims now pending in the application, it is requested that the Examiner telephone Mr. Raymond R. Moser Jr., Esq. at (732) 530-9404 so that appropriate arrangements can be made for resolving such issues as expeditiously as possible.

Respectfully submitted,

5-5-00
Date

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